

We Claim:

1. An alignment and/or retention structure for receiving a plurality of components, comprising:
 - a base;
 - a plurality of alignment and/or retention fixtures attached to the base and having desired positions relative to one another,
 - wherein one or more of the following conditions is met:
 - (1) the base and the alignment and/or retention fixtures are substantially monolithic,
 - (2) the alignment and/or retention fixtures comprise at least one material deposited as a plurality of layers, or
 - (3) the alignment and/or retention fixtures are formed in a single process in their respective relative positions.
2. The structure of claim 1 wherein the base and at least a portion of the alignment and/or retention fixtures are connected by a deformable material that allows fine adjustments of the fixtures relative to the base to be made to optimize alignment and/or retention of components.
3. The structure of claim 1 wherein the deformable material comprises a low melting point metal that can be heated to allow deformation.
4. The structure of claim 2 wherein the deformable material is a material that comprises a structural configuration that allows relatively easy deformation along at least one axis.
5. The structure of claim 1 wherein at least one alignment and/or retention fixture comprises at least one stop in a direction of motion parallel to a plane of a surface of the base.

6. The structure of claim 1 wherein at least one alignment and/or retention fixture comprises at least one stop in a direction of motion perpendicular to a plane of a surface of the base.

7. The structure of claim 1 wherein at least one retention fixture comprises at least structure for retaining a component in a desired position.

8. The structure of claim 1 wherein at least one alignment and/or retention fixture comprises a structure for guiding a component to a desired position.

9. The structure of claim 1 wherein at least a first alignment and/or retention fixture is located at a first surface of the base and at least a second alignment and/or retention fixture is located at a second surface of the base.

10. The structure of claim 1 wherein the base comprises an opening that extends from one surface to another surface and through which material or information may pass to or from a component aligned or retained relative thereto.

11. The structure of claim 1 wherein at least one alignment and/or retention fixture is capable of receiving a secondary alignment and/or retention fixture to which a component may be aligned and/or retained.

12. The structure of claim 1 wherein the alignment and/or retention fixtures comprise a material deposited on substantially a layer-by-layer basis or the alignment and/or retention fixtures are formed in a single process in their respective relative positions, and wherein the structure comprises two or more conductive paths separated from one another by a dielectric, wherein at least one of the paths meets at least one of the following criteria:

(1) the at least one path forms a connection between at least two electrical contact points on a single component;

(2) the at least one path forms a connection between electrical contact points on at least two different components;

(3) the at least one path allows an electrical connection to be made from the structure to a separate structure;

(4) the structure is adapted to be located in a substantially hermetic package and the at least one path allows an electrical connection to be made from the structure to a separate structure that is external to the package;

(5) the at least one path makes an electrical connection to an electrically functional device that was formed along with the structure; or

(6) the at least one path comprises a component that guides and/or modifies an RF or microwave signal.

13. The structure of claim 1 wherein at least a portion of at least one alignment and/or retention fixture contacts the at least one dielectric region and at least a portion of at least one alignment and/or retention fixture contacts the at least one conductive region.

14. The structure of claim 1 wherein the structure is capable of receiving photonic components for forming a photonics device.

15. The structure of claim 14 wherein the photonics components include at least one optical generation, detection, or manipulation device.

16. The structure of claim 1 wherein the fixtures are adapted to align and/or retain at least one of

- (1) an electronic component;
- (2) an electrical component;
- (3) a component capable of controlling or directing the flow of a liquid or a gas; or
- (4) a component for modifying, controlling, or detecting temperature.

17. The structure of claim 1 wherein the structure is adapted to engage with a housing structure.

18. The structure of claim 1 wherein the structure comprises elements that provide an electrical functional, a thermodynamic function, an optical or photonic function, and/or a mechanical function.

19. The structure of claim 1 wherein the structure comprises at least one fixture having a retention functionality comprising at least one of: (1) a pivotable structure that includes a retention arm and an actuation arm that move substantially in conjunction with one another, (2) a retention arm that slides over the component and holds one side while the opposite side is held, at least in part, by the elastomeric deformation of a compression element, or (3) a retention arm that engages a side of a component and inhibits the component from backing out in a direction opposite to a loading direction and a stop component that inhibits further inward loading of the component.

20. The structure of claim 1 whose production comprises one or more of the following operations:

(1) selectively electrodepositing a first conductive material and electrodepositing a second conductive material, wherein one of the first or second conductive materials is a sacrificial material and the other is a structural material;

(2) electrodepositing a first conductive material, selectively etching the first structural material to create at least one void, and electrodepositing a second conductive material to fill the at least one void;

(3) electrodepositing at least one conductive material, depositing at least one flowable dielectric material, and depositing a seed layer of conductive material in preparation for formation of a next layer of electrodeposited material, and/or

(4) selectively electrodepositing a first conductive material, then electrodepositing a second conductive material, then selectively etching one of the first or second conductive materials, and then electrodepositing a third conductive material,

wherein at least one of the first, second, or third conductive materials is a sacrificial material and at least one of the remaining two conductive materials is a structural material.

21. A device, comprising:
- (a) an alignment and/or retention structure, comprising:
 - (1) a base;
 - (2) a plurality of alignment and/or retention fixtures adhered to the base and having desired positions relative to one another;
 - (b) a plurality of components mounted on the alignment structure in positions dictated by the alignment and/or retention fixtures,
- wherein one or more of the following conditions are met:
- wherein one or more of the following conditions are met:
 - (1) the base and the alignment and/or retention fixtures are monolithic,
 - (2) the alignment and/or retention fixtures comprise a material deposited on substantially a layer-by-layer basis, or
 - (3) the alignment and/or retention fixtures are formed in a single process in their respective relative positions.

22. The device of claim 21 wherein the base and at least a portion of the alignment and/or retention fixtures are connected by a deformable material that allows fine adjustments of the fixtures relative to the base to be made to optimize alignment and/or retention of components.

23. The device of claim 21 wherein the deformable material comprises a low melting point metal that can be heated to allow deformation.

24. The device of claim 23 wherein the deformable material is a material that comprises a structural configuration that allows relatively easy deformation along at least one axis.

25. The device of claim 21 wherein at least one alignment and/or retention fixture comprises at least one stop in a direction of motion parallel to a plane of a surface of the base.

26. The device of claim 21 wherein at least one alignment and/or retention fixture comprises at least one stop in a direction of motion perpendicular to a plane of a surface of the base.

27. The device of claim 21 wherein at least one retention fixture comprises at least structure for retaining a component in a desired position.

28. The device of claims 21 wherein at least one alignment and/or retention fixture comprises a structure for guiding a component to a desired position.

29. The device of claim 21 wherein at least a first alignment and/or retention fixture is located at a first surface of the base and at least a second alignment and/or retention fixture is located at a second surface of the base.

30. The device of claim 21 wherein the base comprises an opening that extends from one surface to another surface and through which material or information may pass to or from a component aligned or retained relative thereto.

31. The device of claim 21 wherein at least one alignment and/or retention fixture is capable of receiving a secondary alignment and/or retention fixture to which a component may be aligned and/or retained.

32. The device of claim 21 wherein the alignment and/or retention fixtures comprise a material deposited on substantially a layer-by-layer basis or the alignment and/or retention fixtures are formed in a single process in their respective relative positions, and wherein the structure comprises two or more conductive paths separated

from one another by a dielectric, wherein at least one of the paths meets at least one of the following criteria:

- (1) the at least one path forms a connection between at least two electrical contact points on a single component;
- (2) the at least one path forms a connection between electrical contact points on at least two different components;
- (3) the at least one path allows an electrical connection to be made from the structure to a separate structure;
- (4) the structure is located in a substantially hermetic package and the at least one path allows an electrical connection to be made from the structure to a separate structure that is external to the package;
- (5) the at least one path makes an electrical connection to an electrically functional device that was formed along with the structure;
- (6) the at least one path comprises a component that guides and/or modifies an RF or microwave signal.

33. The device of claim 21 wherein at least a portion of at least one alignment and/or retention fixture contacts the at least one dielectric region and at least a portion of at least one alignment and/or retention fixture contacts the at least one conductive region.

34. The device of claim 21 wherein the structure has received photonic components for forming a photonics device.

35. The device of claim 34 wherein the photonics components include at least one optical generation, detection, or manipulation device.

36. The device of claim 21 wherein the fixtures align and/or retain at least one of

- (1) an electronic component;
- (2) an electrical component;

(3) a component capable of controlling or directing the flow of a liquid or a gas; or

(4) a component for modifying, controlling, or detecting temperature.

37. The device of claims 21 wherein the structure is engaged with a housing structure for forming a substantially hermetic cavity around at least a portion of one surface of the base.

38. The device of claim 21 wherein the structure comprises elements that provide an electrical functional, a thermodynamic function, an optical or photonic function, and/or a mechanical function.

39. The device of claim 21 wherein the structure comprises at least one fixture having a retention functionality comprising one of: (1) a pivotable structure that includes a retention arm and an actuation arm that move substantially in conjunction with one another, (2) a retention arm that slides over the component and holds one side while the opposite side is held, at least in part, by the elastomeric deformation of a compression element, or (3) a retention arm that engages a side of a component and inhibits the component from backing out in a direction opposite to a loading direction and a stop component that inhibits further inward loading of the component.

40. The device of claim 21, wherein production of at least a portion of the device comprises one or more of the following operations:

(1) selectively electrodepositing a first conductive material and electrodepositing a second conductive material, wherein one of the first or second conductive materials is a sacrificial material and the other is a structural material;

(2) electrodepositing a first conductive material, selectively etching the first structural material to create at least one void, and electrodepositing a second conductive material to fill the at least one void;

(3) electrodepositing at least one conductive material, depositing at least one flowable dielectric material, and depositing a seed layer of conductive material in preparation for formation of a next layer of electrodeposited material, and/or

(4) selectively electrodepositing a first conductive material, then electrodepositing a second conductive material, then selectively etching one of the first or second conductive materials, and then electrodepositing a third conductive material, wherein at least one of the first, second, or third conductive materials is a sacrificial material and at least one of the remaining two conductive materials is a structural material.